

What is claimed is:

1. A porous hollow fiber membrane having a permselectivity, characterized by having a particle cutoff within the range of 1 to 10  $\mu\text{m}$  and a pure water permeate flow equal to or higher than 30,000  $\text{L}/\text{m}^2/\text{hr}/100 \text{ kPa}$ .
2. The porous hollow fiber membrane as defined in Claim 1, wherein the particle cutoff is within the range of 2 to 5  $\mu\text{m}$  and the pure water permeate flow is equal to or higher than 100,000  $\text{L}/\text{m}^2/\text{hr}/100 \text{ kPa}$ .
3. The porous hollow fiber membrane as defined in Claim 1, wherein the porous hollow fiber membrane is made of a polysulfone material.
4. The porous hollow fiber membrane as defined in Claim 3, wherein the porous hollow fiber membrane is made of a polysulfone material containing 1 to 10 wt% of a hydrophilic polymer.
5. The porous hollow fiber membrane as defined in Claim 4, wherein the hydrophilic polymer is a polyvinylalcohol polymer.
6. A method of making a porous hollow fiber membrane, characterized by comprising the steps of:

while a spinning dope containing a base polymer as a material for forming the porous hollow fiber membrane, an additive used for facilitating a phase separation of the spinning dope, a solvent compatible with both the base polymer and the additive and a mass of microparticles insoluble to the compatible solvent and uniformly dispersed in a liquid medium and having an average particle size within the range of 1 to 20  $\mu\text{m}$ , and a coagulating liquid for forming the hollow fiber membrane is used, forming the hollow fiber membrane according to a dry-wet spinning method or a wet spinning method; and

extracting and removing the microparticles by immersing the hollow fiber membrane, which has been spun, into an extracting solution effective to dissolve the microparticles, but ineffective to dissolve the base polymer.

7. The method of making the porous hollow fiber membrane as defined in Claim 6, wherein the spinning dope is used in the form of a uniform spinning

dope of a composition in which when only the base polymer, the additive and the solvent compatible to both the base polymer and the additive are dissolved, phase separation takes place, but addition of the microparticles suppresses the phase separation to enable spinning of the hollow fiber membrane.

8. The method of making the porous hollow fiber membrane as defined in Claim 6, wherein the microparticles are microparticles of silicon oxide.

9. The method of making the porous hollow fiber membrane as defined in Claim 6, wherein the coagulating liquid for forming the hollow fiber membrane is a solution containing 1 to 10 wt% of a polyvinyl alcohol.

10. A porous hollow fiber membrane module which comprises:

a plurality of porous hollow fiber membranes each manufactured as set forth in Claim 1, each of the porous hollow fiber membranes having an effective length not greater than 50 cm, each or a block of the porous hollow fiber membranes being sealed at one end thereof;

a housing;

a protective casing; and

a bonding resin block accommodated within the housing and positioned at a lower end region of the housing while an end sealing region is positioned in an upper region of the housing when the module is in use.

11. A method of using porous hollow fiber membranes manufactured as set forth in Claim 1 for preparing a purified water, which method comprises a step of filtering an untreated water from a water source through the porous hollow fiber membranes.

12. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 10 for preparing a purified water, which method comprises a step of filtering an untreated water from a water source through the porous hollow fiber membrane module.

13. A method of using porous hollow fiber membranes manufactured as set forth in Claim 1 for preparing a purified water, which method comprises a

step of coagulating an untreated water from a water source with a coagulating agent and a step of subsequently filtering the water through the porous hollow fiber membranes.

14. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 10 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source with a coagulating agent and a step of subsequently filtering the water through the porous hollow fiber membrane module.

15. A method of using porous hollow fiber membranes manufactured as set forth in Claim 1 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source with a coagulating agent, a step of subsequently subjecting the water to a sedimentation or a pressurized floatation treatment to separate suspended particles from the water, and a step of finally filtering the water, from which the suspended particles have been separated, through the porous hollow fiber membranes.

16. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 10 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source with a coagulating agent, a step of subsequently subjecting the water to a sedimentation or a pressurized floatation treatment to separate suspended particles from the water, and a step of finally filtering the water, from which the suspended particles have been separated, through the porous hollow fiber membrane module.

17. A method of using porous hollow fiber membranes manufactured as set forth in Claim 1 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source with a coagulating agent, a step of subsequently subjecting the water to a sedimentation or a pressurized floatation treatment to separate suspended particles from the water, a step of finally filtering the water, from which the suspended particles have been

separated, through a sand filter, and a step of filtering the sand-filtered water through the porous hollow fiber membranes.

18. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 10 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source with a coagulating agent, a step of subsequently subjecting the water to a sedimentation or a pressurized floatation treatment to separate suspended particles from the water, a step of filtering the water, from which the suspended particles have been separated, through a sand filter, and a step of finally filtering the sand-filtered water through the porous hollow fiber membrane module.

19. A method of using porous hollow fiber membranes manufactured as set forth in Claim 1 for preparing a purified water, which method comprises a step of filtering an untreated water from a water source through a sand filter and a step of subsequently filtering the sand-filtered water through the porous hollow fiber membranes.

20. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 10 for preparing a purified water, which method comprises a step of filtering an untreated water from a water source through a sand filter and a step of subsequently filtering the sand-filtered water through the porous hollow fiber membrane module.

21. A method of using porous hollow fiber membranes manufactured as set forth in Claim 1 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source, a step of subsequently filtering the treated water through a sand filter, and a step of filtering the sand-filtered water through the porous hollow fiber membranes.

22. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 10 for preparing a purified water, which method comprises a step of coagulating an untreated water from a water source, a

step of subsequently filtering the treated water through a sand filter, and a step of filtering the sand-filtered water through the porous hollow fiber membranes.

23. A method of using porous hollow fiber membranes as described in Claim 1 for preparing a purified water, which method further comprises a step of subjecting the water to at least one of ozone treatment, activated carbon treatment and chlorine treatment either before or after the filtration through the porous hollow fiber membranes.

24. A method of using a porous hollow fiber membrane module as described in Claim 10 for preparing a purified water, which method further comprises a step of subjecting the water to at least one of ozone treatment, activated carbon treatment and chlorine treatment either before or after the filtration through the porous hollow fiber membrane module.

25. A method of using porous hollow fiber membranes manufactured as set forth in Claim 11, wherein the purified water is prepared by backwashing separation membranes at intervals of a predetermined time with use of a gaseous medium.

26. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 12, wherein the purified water is prepared by backwashing separation membranes at intervals of a predetermined time with use of a gaseous medium.

27. A method of using porous hollow fiber membranes manufactured as set forth in Claim 11, wherein the purified water is prepared by backwashing separation membranes at intervals of a predetermined time with use of a hot water of a temperature not lower than 60 °C.

28. A method of using a porous hollow fiber membrane module manufactured as set forth in Claim 12, wherein the purified water is prepared by backwashing separation membranes at intervals of a predetermined time with use of a hot water of a temperature not lower than 60 °C.